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QUARTE LY PROCRESS REPORT NO. 1A

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

for

Office of Research Grants and Contracts Code BG National Aeronautics and Space Administration

July 1962

Metallurgical Research Laboratories Department of Chemical Engineering and Metallurgy Syracuse University

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QUARTERLY PROGRESS REFORT NO. 1A (Period from April 23, 1962 to June 30, 1962)

MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

for

Code  $\mathbf{E}\mathcal{G}$  National Aeronautics and Space Administration Office of Research Grants and Contracts

R. J. Sell, C. Chave and V. Weiss

Contract No. NASr-43 Account No. 1620.873

## MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE

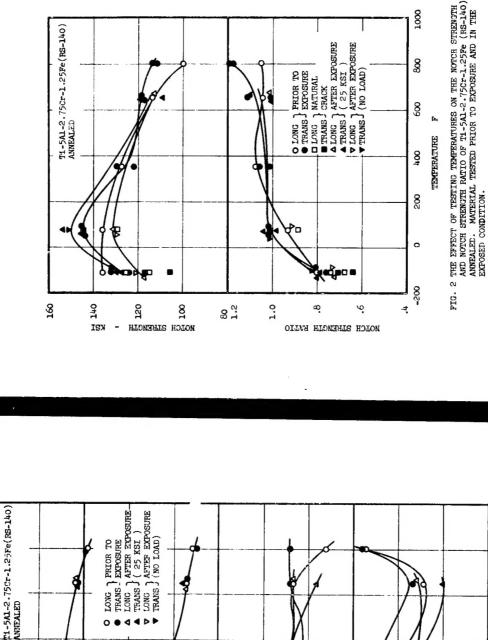
(RS-120A) in the annealed condition and solution treated and aged condition and Republic PH 15-7 Mo in condition CH-900 and RH-1100 are presented in Data obtained during this period for T1-5A1-2.75Cr-1.25Fe (RS-140) This report covers work performed during the period April 23, 1962 through 4. Preliminary data on Armco PH 15-7 Mo heat number 830656, in condition CH-900 is also presented in figures 5 and 6. In addition to enable the data herein to be available for the sixth meeting of the notch strength ratio versus stress concentration factor for Ti-5A1-4V through the period June 30, 1962. The period reported was shortened annealed and T1-441-3Mo-1V (RS-115) annealed, is shown in figures 1 Special Committee for Materials Research for Supersonic Transports which meets in Washington, D. C. on July 17 and 18, 1962.

Table I shows stress concentration factor (Kt) for the various

notch root radii used.

figures 7 and 8.

South store of the think of the store of the Tensile others A



KZI

TENSILE STRENGTH

O.2≰ YIELD STRENCTH KEI

7,7

WODNING OF ELASTICTITY

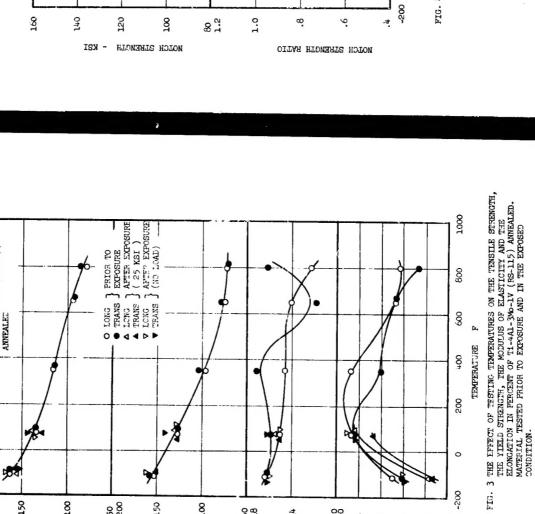
유큐

PERCENT

ELONGATION

FIG. 1 THE EFFECT OF TESTING TEMPERATURES ON THE TEMSILE STRENGTH, THE YIELD STRENGTH, THE MODILUS OF ELASTICITY AND THE ELONGATION IN PERCENT OF TL-571-2.75FC-1.25FC (FS-140)

TEMPERATURE 



THE BFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH FRENGTH RATIO OF TL-+AL-3Mo-1V (RS-115).
ANYBALED. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION. FIG. 4

2

1000

8

8

200

0

TEMPERATURE 00

O LONG PRIOR TO

TANKS EXPOSITE

LING NATURAL

TANKS CRACK

LICHG AFTER EXPOSURE

TANKS ( 25 KSI )

VIONG PATTER EXPOSURE

TEANS ( NO LOAD)

T1-4A1-3M0-1V (RS-115)

T1-4A1-3Mc..IV (RS 115) ANNEALET

500

150

200

TENSILE STRENGTH

200

150

8

ISX

O.24 YIELD STRENGTH

282

#

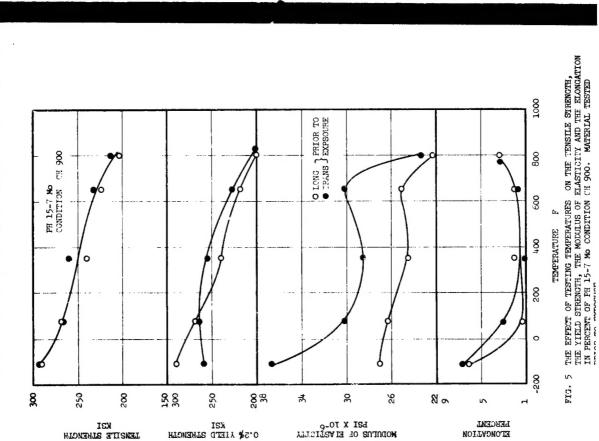
MODULUS OF ELASTICITY
PSI X 10-6

22 00 9

a

PERCENT

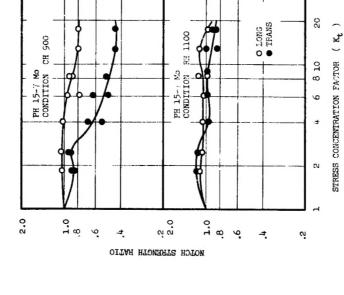
ELONGATION



900 ск 900 PH 15-7 Mo CONDITION 600 F 400 TEMPERATURE LCNG PRIOR TO TRANS EXPOSURE LONG AFTER EXPOSURE TRANS ( 40 KSI ) 0 • 4 • -500 1.0 ထံ 260 220 188 140 NOTCH STRENGTH - KSI NOTCH STRENGTH RATIO

THE EFFECT OF TESTING TEMPERATURES ON THE NOTCH STRENGTH AND NOTCH STRENGTH FAILO OF PH 15-7 MG CONDITION OF 900. MATERIAL TESTED PRIOR TO EXPOSURE AND IN THE EXPOSED CONDITION. FIG. 6

ELONGATION



T1-6A1-4V (RS-120)
SOLUTION TREATED

AND AGED

0,0

NOTCH STRENGTH RATIO

9. 8.

φ. <del>4</del>

LONG

0 •

T1-6A1-4V (RS-120A) ANNEALED

5.0

1.0

9 4

E

FIG. 8 NOTCH STRENGTH RATIO VERGUS STRESS CONCENTRATION FACTOR (K<sub>L</sub>) FOR PH 15-7 Mo IN CONDITION CH-900 AND IN CONDITION RH-1100. TESTED AT 75F. SINGLE POINT DESIGNATES AVERAGE OF TWO TESTES.HAVING CLOSE NSR VALUES.

. .

6

89

NOTCH STRENOTH RATIO VERSUS STRESS CONCENTRATION FACTOR (K. ) FOR TH-6A1-4V (RS-120A) IN THE ANNEALED CONDITION AND IN THE SOLUTION TREATED AND A END CONDITION. TESTED AT 75F. SINGLE POINT DESIGNALES AVERAGE OF TWO TESTS HAVING CLOSE NER VALUES.

50

8 10

9

CU

αį

STRESS CONCENTRACTION FACTOR ( Kt.)

7

FIG.

 NOTCH
 STRESS

 RADII
 CONCENTRATION

 <.001</td>
 >17.31

 .002
 12.75

 .005
 6.30

 .310
 6.07

 .025
 4.00

 .380
 2.48

 .187
 1.83

TABLE I